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INFORMATION REPORT

OFFICE OF NAVAL INTELLIGENCE

OPNAV FORM 8820-2 (CNFG)

SERIAL NO.

1139-54

DATE OF REPORT

19 Oct 1954

DATE OF INFORMATION

Jul 1954

FROM

COMNAVGR APO 742

SOURCE

MUNICH 54-25

EVALUATION

B-2

REQUEST NO.

SUBJECT

GERMANY/FED. REP./GDR - Light-Flash Stroboscopes and Spark-Flash Device

BRIEF (FOR REPORTS OF MORE THAN ONE PAGE, ENTER CAREFUL SUMMARY)

Equipment described: "Super Stroboskop" by the firm Physikalisch-Technisches Laboratorium Dr. Ing. Frank FRUENGEL, HAMBURG; Light Flash Stroboskop LS-911, and Spark-Flash Device by the firm WEB MESSEGERATEWERK ZWOENTZ-VVB RMT (GDR). Specifications and operation.

Encs: (1) Photograph showing the pulse projector lamp.

(2) Photograph of the Light Flash Stroboscope LS-911

(3) Photograph of the Spark-Flash Device FA-902

Special Handling Required

Not releasable to foreign national without approval of CNO (DNI).

1. "SUPER STROBOSKOP": The firm "Physikalisch-Technisches Laboratorium Dr. Ing. Frank FRUENGEL", HAMBURG-RISEN, builds the light flash equipment "Super Stroboskop". This equipment is said to possess outstanding qualities as regards the shortness of produced flashes, power output, and engaging accuracy.

When an argon-filled spark chamber is used, the duration of one light flash is about 10^{-6} seconds at an intensity of $40 \cdot 10^6$ watts. The engaging accuracy is better than 10^{-7} seconds. By using an additional device (additional pulse condenser having an extremely low inductivity) the light flash intensity can be increased to $200 \cdot 10^6$ watts (in this case, the duration of the individual flashes would be $2 \cdot 10^{-6}$ sec.)

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OPNAV FORM 8520-2 (G) (CHPS)

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By filling the spark chamber with CO_2 or N_2 , the duration of light flashes can be reduced to less than $0.5 \cdot 10^{-6}$. The effected shortness of duration, however, is accompanied by a reduction in intensity.

The pulse projector lamp shown on enclosure (1) was mounted on a stand in such a manner that it could be turned in all directions. Both a pulse keying and charging apparatus and a control device were arranged below the lamp. The main power supply input is only 300 watts. If desired, the pulse projector can be delivered in a water-tight form so that it can be used for under-water tests.

The charging and control device charges an impulsing condenser battery which (together with the spark chamber and a mirror) is incorporated into the pulse projector. The spark chamber is decomposable. It consists of a base plate, a tombac bellow (tombac is a copper base zinc alloy), a quartz cylinder, a plexi-glass cap, and silicone packings. The electrodes are made of sintered tungsten. The quartz cylinder offers the advantage of being capable of emitting U V radiation so that, by adding inertia-less fluorescing materials, special photographic effects can be achieved in hydromechanical experiments.

The impulsing condenser battery is composed of three styreflex ~~in~~ condensers. The brightness of the flashes can be modified by changing the filling pressure. The electrode distance can be adjusted by means of an adjusting screw. The pulse keying and charging device operates in the periodic pulse range of 0 - 20,000 light-flashes per minute. In addition, it allows for both the release of single flashes through either a shutter or a built-in pressure knob, and separate control through a contact breaker. A relay is incorporated for automatic blocking during the various operations.

The employed control device is a pulse generator of the firm "DUELLLO" (see COMNAVGER IR 948-54 dtd 8 Sep 54) working in the ranges: 400 - 8,000 pulses/min. and 700 - 18,000 pulses/min.

Accessories delivered by the firm Dr. Ing. PRUENGEL are the pulse retarding instruments Retarder I and Retarder II. Both instruments are used to insert an adjustable time interval between either a releasing pulse and a light flash, or one light-flash and another (Retarder I: $1 - 120 \cdot 10^{-6}$ sec; Retarder II: $100 - 2500 \cdot 10^{-6}$ sec).

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OPNAV FORM 8870-2 (C) (CHPO)

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Prices (approximately):

Light flash lamp	2,000 DM
Pulse keying and charging device	3,400 DM
Control device "DRELLLO"	1,400 DM
Additional pulse condenser	1,400 DM
Retarder I and II	3,200 DM

2. LIGHT FLASH STROBOSKOP LS-911: The VEB MESSGERAETEWERK ZWOENITZ - VEB RFT (GDR) developed the light flash stroboscope LS-911 shown on enclosure (2). The equipment includes the instrument producing the relaxation oscillations and a mercury high pressure lamp serving as the light source. The apparatus incorporates an oscillatory circuit which, over a transmitter, excites the main circuit (supplying the power to the lamp) in the same rhythm. The relaxation oscillatory frequency (and with it the number of light flashes) is controlled in coarse stages by connecting and disconnecting condensers. Fine adjustment is effected by changing the grid bias voltage. The number of light flashes is measured by a special relaxation circuit and indicated directly by a moving coil measuring device. The reading error is $\pm 2\%$ of the terminal scale value. Technical data of the instrument are:

a. Light flash range:

6 - 800 light flashes/sec., adjustable in six coarse stages; fine regulation within each stage.

b. Duration of one light flash: about 10^{-5} sec.

c. Light intensity of a light flash: 50,000 Hefner units (providing a spontaneous increase for photography).

d. Power supply:

Main supply voltage: 220 volt/40-60 c/s.
Power input, about 300 VA.

e. Tubes:

1 high pressure lamp HJE 50 W

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OPNAV FORM 8020-2 (C) (CNPB)

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- 1 tube type S 0,8/2 1 III
- 2 tube type S 1/0,2 1 II A
- 2 tube type RQ 7,5/0,6
- 1 tube type STV 280/40
- 1 tube type EW 3-9 V/2A

f. Dimensions: 550 x 250 x 320 mm

g. Weight: about 30 kg

3. SPARK FLASH DEVICE FA-902: In addition, the VEB MESSGERAETEWERK ZWOENITZ - VVB NE RFT has developed the spark flash device ~~FA-902~~ shown on enclosure (3). The main spark gap is supplied the required voltages by a condenser battery which is charged by the main power supply over a high voltage unit. A special unit controls and feeds an auxiliary spark gap (lying in the main spark gap) used to realize both the unambiguous ignition conditions and the release of the main spark (light flash). The auxiliary spark gap is controlled through pulses by both controlling ~~ix~~ transmitters and thyatron. The spark flash is released either by opening or closing a contact which can be connected to the apparatus from the outside, or by feeding a "foreign pulse" to specially marked sockets.

Some technical data of the equipment are as follows:

a. Half value period of the light flash:

about 1.5×10^{-6} s.

b. Maximum light flash intensity:

about 1.5×10^{-6} Hefner units.

c. Time of delay from pulse transmission to maximum intensity:

about 2×10^{-6} s.

d. Power supply:

Main power supply: 110/125/220 V/50 c/s.

Power input: about 90 VA.

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e. Tubes:

1 tube type S 1/C.2 1 II A
2 tubes type EZ 12
1 tube type RFG 5

f. Dimensions: 220 x 285 x 425 mm.

g. Weight: about 15 kg.

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OPNAV FORM 3850-2(1) (CNP)

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Preparing Officer's Comment: I. The "Superstroboskop" is capable of delivering light flashes of extreme brightness (40 megawatts) and short duration (a few millionths of second). This accommodates good photography even of fast processes (speeds up to 100 m/sec).

II. During World War II, Dr. Frank FRUENDEL built high-quality measuring instruments for German aeronautical research laboratories. He is considered to be an expert in this field.

III. The spark flash intensity achieved by the spark flash equipment FA-902 is much lower than that of the "Super-Stroboskop". However, it can still be used for testing purposes.

Collected by:

Prepared by:

Vladimir L. RYCHLY
Lieutenant Commander, U.S. Navy

H. C. ASHENFELTER
Lieutenant Commander, U.S. Navy

Forwarded:

D. L. DAY
CAPT USN

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